The Economics of Utility Ownership of Wind Energy Facilities Brent E. Gale Senior Vice President

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2 MidAmerican Energy 2004-07 Fossil Generation Projects

- 540 MW combined-cycle gas generation plant (GDMEC) placed in service in 2004 in central lowa
- 800 MW of super-critical, western-low-sulfur, coal-fired unit (CBEC 4) under construction in western lowa with completion in 2007; MidAmerican's share is 480 MW

MidAmerican Energy 2004-05 Wind Generation Project Overview

- 360.5 MW of 1.0 to 1.5MW turbines on 25,000+ acres in northwest and north-central lowa
- 65 meter towers 70 meter rotors
- Primarily Class 4 wind resource with 34% capacity factor expected
- 160 MW placed in service in 2004 in northwest lowa; remainder in north-central lowa to be in service in 2005

4 MidAmerican Energy 2004-05 Wind Generation Project Overview [continued]

- 37% 40% capacity factor possible with 80 meter towers and 77 meter rotors, but customer economics less favorable based on 2004 costs
- Comparative 2005 turbine, tower and blade prices for longer blades and taller towers improve customer economics; but
 - Limited 2005 deliverability
 - Exchange rate risk
 - Higher prices



- 6 MidAmerican Energy Fuel Diversity Nameplate Capacity
- 7 MidAmerican Energy Fuel Diversity Accredited Capacity
- 8 MidAmerican Energy Fuel Diversity –Energy

9 MidAmerican Energy Comparative Generation All-In Costs

- Existing Coal Units: <2.5 cents per kWh
- Existing Nuclear Units: <3.0 cents per kWh
- New Coal [CBEC 4]: 3.0 cents per kWh
- New Gas Combined Cycle: >6.0 cents per kWh
- New Gas Combustion Turbine: >10.0 cents per kWh

Wind Project Economics – 2004 All-In Cost per kWh Without Credits

Assumptions:

- \$1050/kW capital cost
- 34% capacity factor

- 50-50 capital structure
- 7% debt cost; 12.2% equity return
- 20-year depreciation life
- \$25,000 annual O & M per MW

20-year levelized cost per kWh = 5 cents

11 Wind Project Economics With 2004 Federal Production Tax Credit

- Wind Without Federal Production Tax Credit:
 - 5.0 cents per kWh 1
- Wind With 2004 Inflation-Adjusted Federal Production Tax Credit:
 3.0 cents per kWh ¹

12 Caution

The foregoing costs do not include substation and transmission costs which can total millions of dollars.

13 Wind's Place in the Portfolio

- Wind is variable, largely non-dispatchable, and not reliable for serving Midwest peak conditions
- · Wind supplements baseload generation; it is not a substitute for it
- 14 Summer Peak Month Coincidence
- 15 Historical Annual Load/Output
- Offsets to the Variability and Non-Dispatchability of Wind Power-Benefits of Utility Ownership

Cash Flows

- Federal Production Tax Credit
- Sale of Renewable Energy/CO2 Credits
- State Incentives
- Increased Wholesale Energy Sales
- Capacity Credit
- Federal Bonus Depreciation (2004)

17 Issues to Consider for the Wind Energy Power Purchase Alternative

- · Debt leverage risk
- · Developer counterparty business risk
- Operational/delivery risk
- Transmission risk
- · Dispatchability/minimum load
- Class cost allocation
- Ownership of renewable and environmental credits

18 Prerequisites for a Diverse Generation Portfolio

- · A clear statement of state energy policy; and
- Modification of state least-cost standards via:
 - Substitution of reasonable cost standard; or
 - Exception for renewables; or

- Requirement to recognize externalities including the benefits of portfolio/fuel diversity

19 What Is Needed to Spur Development of Renewables?

- Elimination of state barriers
- A national renewable credit trading program
- Continuation of the federal Production Tax Credit at some level until the credit trading market is robust
- State Renewable Production Standard mandates are NOT required and are counterproductive
- 20 MidAmerican Energy QUESTIONS?